CLAIMS:

1. A method (700) for compressing an input stream (214) of video frames, comprising:

transforming each of a plurality of video frames into a plurality of wavelet bands in one or more decomposition levels;

performing motion compensated temporal filtering on at least some of the wavelet bands to generate a plurality of high-pass frames and a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

compressing the high-pass frames and the low-pass frames for transmission over a network (106).

2. The method (700) of Claim 1, further comprising:

generating one or more overcomplete wavelet expansions used during the motion compensated temporal filtering;

generating one or more motion vectors during the motion compensated temporal filtering;

compressing the one or more motion vectors; and

multiplexing the compressed high-pass frames, low-pass frames, and one or more motion vectors onto an output bitstream (220).

3. The method (700) of Claim 1, further comprising generating an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

4. A method (800) for decompressing a video bitstream (220), comprising:

receiving a video bitstream (220) comprising a plurality of compressed high-pass frames and low-pass frames;

decompressing the compressed high-pass frames and low-pass frames;

performing inverse motion compensated temporal filtering on at least some of the decompressed high-pass frames and low-pass frames to generate a plurality of wavelet bands associated with the video frames, the wavelet bands associated with one or more decomposition levels, the wavelet bands generated starting at a lowest decomposition level; and

transforming the wavelet bands into one or more restored video frames.

5. The method (800) of Claim 4, further comprising:

demultiplexing one or more compressed motion vectors and the compressed high-pass frames and low-pass frames from the bitstream (220);

decompressing the one or more compressed motion vectors, the one or more motion vectors used during the inverse motion compensated temporal filtering; and

generating one or more overcomplete wavelet expansions, the one or more overcomplete wavelet expansions used during the inverse motion compensated temporal filtering.

6. The method (800) of Claim 4, further comprising generating an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

7. A video encoder (110) for compressing an input stream (214) of video frames, comprising:

a wavelet transformer (202) operable to transform each of a plurality of video

frames into a plurality of wavelet bands in one or more decomposition levels;

a plurality of motion compensated temporal filters (204) operable to process at least some of the wavelet bands and generate a plurality of high-pass frames and a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

an encoder (208) operable to compress the high-pass frames and the low-pass frames for transmission over a network (106).

8. The video encoder (110) of Claim 7, further comprising:

a low band shifter (206) operable to generate one or more overcomplete wavelet expansions used by the motion compensated temporal filters (204), the motion compensated temporal filters (204) further operable to generate one or more motion vectors;

a second encoder (210) operable to compress the one or more motion vectors; and

a multiplexer (212) operable to multiplex the compressed high-pass frames, low-pass frames, and one or more motion vectors onto an output bitstream (220).

9. The video encoder (110) of Claim 8, wherein the low band shifter (206) is operable to generate an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

10. A video decoder (118) for decompressing a video bitstream (220), comprising:

a decoder (404) operable to decompress a plurality of compressed high-pass frames and low-pass frames contained in the bitstream (220);

a plurality of inverse motion compensated temporal filters (408) operable to process at least some of the decompressed high-pass frames and low-pass frames to

generate a plurality of wavelet bands associated with the video frames, the wavelet bands associated with one or more decomposition levels, the wavelet bands generated starting at a lowest decomposition level; and

a wavelet transformer (410) operable to transform the wavelet bands into one or more restored video frames.

11. The video decoder (118) of Claim 10, further comprising:

a demultiplexer (402) operable to demultiplex one or more compressed motion vectors and the compressed high-pass frames and low-pass frames from the bitstream;

a second decoder (406) operable to decompress the one or more compressed motion vectors, the inverse motion compensated temporal filters (408) operable to generate the wavelet bands using the one or more motion vectors; and

a low band shifter (412) operable to generate one or more overcomplete wavelet expansions, the one or more overcomplete wavelet expansions used by the inverse motion compensated temporal filters (408).

12. The video decoder (118) of Claim 11, wherein the low band shifter (412) is operable to generate an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

13. A video transmitter (102), comprising:

a video frame source (108) operable to provide a stream of video frames;

a video encoder (110) operable to compress the video frames, the video transmitter (102) comprising:

a wavelet transformer (202) operable to transform each of the video frames into a plurality of wavelet bands in one or more decomposition levels;

a plurality of motion compensated temporal filters (204) operable to process at least some of the wavelet bands and generate a plurality of high-pass frames and

a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

an encoder (208) operable to compress the high-pass frames and the low-pass frames; and

a buffer (112) operable to receive and store the compressed video frames for transmission over a network (106).

14. The video transmitter (102) of Claim 13, wherein the video encoder (110) further comprises a low band shifter (206) operable to generate one or more overcomplete wavelet expansions used by the motion compensated temporal filters (204), the low band shifter (206) is operable to generate an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

15. A video receiver (104), comprising:

a buffer (116) operable to receive and store a video bitstream;

a video decoder (118) operable to decompress the video bitstream and generate restored video frames, the video decoder (118) comprising:

a decoder (404) operable to decompress a plurality of compressed high-pass frames and low-pass frames contained in the bitstream;

a plurality of inverse motion compensated temporal filters (408) operable to process at least some of the decompressed high-pass frames and low-pass frames to generate a plurality of wavelet bands associated with the video frames, the wavelet bands associated with one or more decomposition levels, the wavelet bands generated starting at a lowest decomposition level; and

a wavelet transformer (410) operable to transform the wavelet bands into one or more restored video frames; and

a video display (120) operable to present the restored video frames.

16. The video receiver (118) of Claim 15, wherein the video decoder (118) further comprises a low band shifter (412) operable to generate one or more overcomplete wavelet expansions used by the inverse motion compensated temporal filters (408), the low band shifter (412) operable to generate an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

17. A computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for:

transforming each of a plurality of video frames into a plurality of wavelet bands in one or more decomposition levels;

performing motion compensated temporal filtering on at least some of the wavelet bands to generate a plurality of high-pass frames and a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

compressing the high-pass frames and the low-pass frames for transmission over a network (106).

18. A computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for:

decompressing a plurality of compressed high-pass frames and low-pass frames contained in a video bitstream (220);

performing inverse motion compensated temporal filtering on at least some of the decompressed high-pass frames and low-pass frames to generate a plurality of wavelet bands associated with the video frames, the wavelet bands associated with one or more

decomposition levels, the wavelet bands generated starting at a lowest decomposition level; and

transforming the wavelet bands into one or more restored video frames.

19. A transmittable video signal produced by the steps of:

transforming each of a plurality of video frames into a plurality of wavelet bands in one or more decomposition levels;

performing motion compensated temporal filtering on at least some of the wavelet bands to generate a plurality of high-pass frames and a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

compressing the high-pass frames and the low-pass frames for transmission over a network (106).

20. The video receiver of Claim 19, wherein the low band shifter is operable to generate an overcomplete wavelet expansion by:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

21. A computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for:

transforming each of a plurality of video frames into a plurality of wavelet bands in one or more decomposition levels;

performing motion compensated temporal filtering on at least some of the wavelet bands to generate a plurality of high-pass frames and a plurality of low-pass frames, the

low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

compressing the high-pass frames and the low-pass frames for transmission over a network.

22. The computer program of Claim 21, further comprising computer readable program code for:

generating one or more overcomplete wavelet expansions used during the motion compensated temporal filtering;

generating one or more motion vectors during the motion compensated temporal filtering;

compressing the one or more motion vectors; and

multiplexing the compressed high-pass frames, low-pass frames, and one or more motion vectors onto an output bitstream.

23. The computer program of Claim 22, wherein the computer readable program code for generating one or more overcomplete wavelet expansions comprises computer readable program code for:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

24. A computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code for:

decompressing a plurality of compressed high-pass frames and low-pass frames associated with a plurality of video frames;

performing inverse motion compensated temporal filtering on at least some of the decompressed high-pass frames and low-pass frames to generate a plurality of wavelet

bands associated with the video frames, the wavelet bands associated with one or more decomposition levels, the wavelet bands generated starting at a lowest decomposition level; and

transforming the wavelet bands into one or more restored video frames.

25. The computer program of Claim 24, further comprising computer readable program code for:

demultiplexing one or more compressed motion vectors and the compressed high-pass frames and low-pass frames from the bitstream;

decompressing the one or more compressed motion vectors, the one or more motion vectors used during the inverse motion compensated temporal filtering; and

generating one or more overcomplete wavelet expansions, the one or more overcomplete wavelet expansions used during the inverse motion compensated temporal filtering.

26. The computer program of Claim 25, wherein the computer readable program code for generating one or more overcomplete wavelet expansions comprises computer readable program code for:

shifting a particular one of the wavelet bands a plurality of times to produce a plurality of shifted wavelet bands, the shifted wavelet bands each shifted differently; and

interleaving wavelet coefficients in the particular wavelet band and wavelet coefficients in each of the shifted wavelet bands to produce a set of overcomplete wavelet coefficients that represent the overcomplete wavelet expansion.

27. A transmittable video signal produced by the steps of:

transforming each of a plurality of video frames into a plurality of wavelet bands in one or more decomposition levels;

performing motion compensated temporal filtering on at least some of the wavelet bands to generate a plurality of high-pass frames and a plurality of low-pass frames, the low-pass frames at each decomposition level generated using the high-pass frames at that decomposition level; and

compressing the high-pass frames and the low-pass frames for transmission over a network.